

Oct. 26, 1965

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3,214,726

NOVEL SAFETY PLUG AND RECEPTACLE FOR LOW-TENSION INSTALLATIONS

Filed Feb. 25, 1963

2 Sheets-Sheet 1

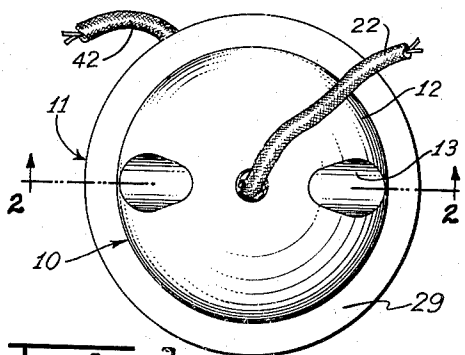


Fig. 1.

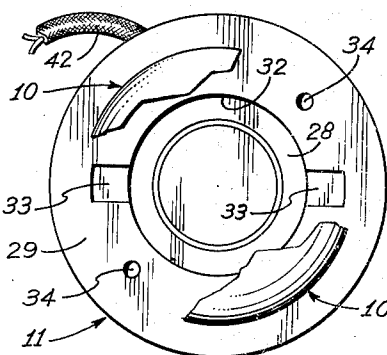


Fig. 3.

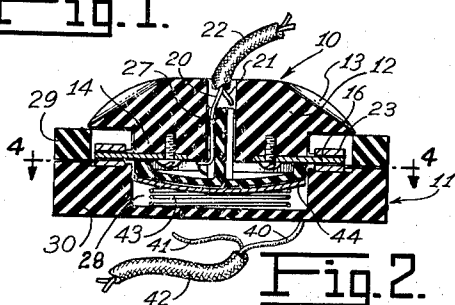


Fig. 2.

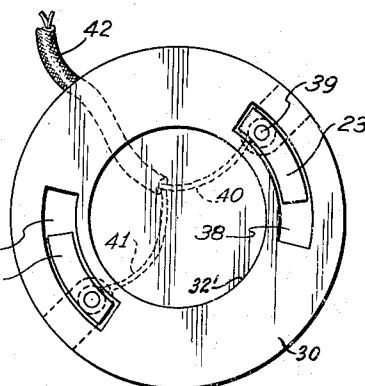


Fig. 4.

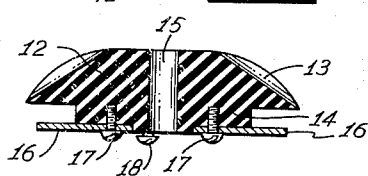


Fig. 5.

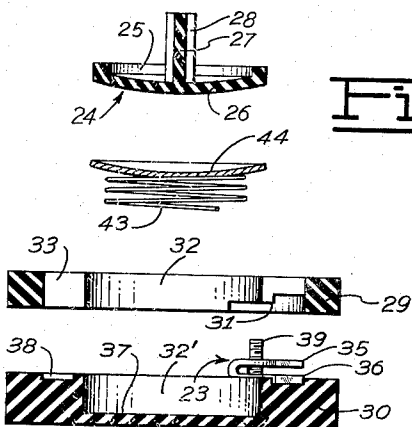
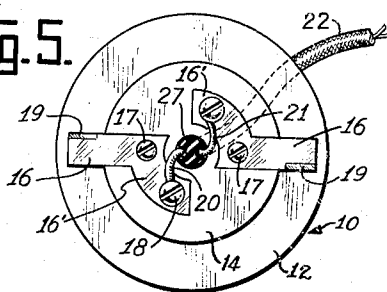


Fig. 6



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NOVEL SAFETY PLUG AND RECEPTACLE FOR LOW-TENSION INSTALLATIONS

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Filed Feb. 25, 1963, Ser. No. 260,547

Claims priority, application Mexico, Apr. 27, 1962,

67,166; Dec. 21, 1962, 70,274

2 Claims. (Cl. 339—189)

The present invention relates to a safety plug and receptacle system for low tension installations, and more particularly to a safety plug and receptacle system for low tension installations which includes the combination of a rotative insertion plug and of a receptacle wherein the electrical conducting parts are completely concealed from the exterior in order to avoid possible accidents when the current conducting parts of said receptacle are inadvertently touched, and still more particularly the present invention refers to such a safety plug and receptacle system which incorporates features of higher safety and efficiency of performance.

Heretofore, all the electrical plug and receptacle systems existing on the market essentially comprised a lead-in plug which has a pair of fingers directed in the axial direction, which fingers are introduced in receiving holes in a receptacle, each one of said holes being provided with a contact engaged by the fingers to take current from said receptacle. However, these electrical plug and receptacle systems, in the first place, only secure the plug by means of pressure between the fingers and the contacts within the receptacle holes, and it frequently happens that a loose or imperfect contact is obtained so that the flow of current inadvertently is interrupted. In the second place, in the conventional systems, there is the possibility of an accident caused by the inadvertent engagement by a person with the contacts within the holes, for instance, by the introduction of a wire or any other metallic device, and this is more particularly so with reference to children, such person receiving an electrical shock which may even be fatal.

Also, many systems are known in the art, which are of the plug and receptacle types, with plugs having axial fingers with projections in the direction of their side edges for their rotative introduction in the receptacle. But all of these systems have the very dangerous defect of lacking completely a safety feature against accidental electrical shocks, and they are also less sturdy and have very low efficiency of performance.

Therefore, an object of the present invention is to provide a novel electrical plug and receptacle system, which employs an absolute safety feature against accidental contact with the parts which carry the current in the receptacle portion of the system.

A more specific object of the present invention is to provide a system of the above character in which a plug is included, which has its fingers extending radially outwardly, in contradistinction with the conventional plug which has the fingers directed axially, and in which system said plug is introduced axially into the receptacle and then partially rotated to lock the fingers within the receptacle.

In a particular embodiment of the invention, a particular object is to provide, in a system of the above character, a plug which has radially directed fingers so that, by means of the axial introduction of said plug within the receptacle and partial rotation, a contact is established with a pair of contacts within the receptacle and, at the same time, the plug is secured against inadvertent removal from the receptacle.

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A further object of the present invention is to provide a system of the above character, wherein the receptacle has a pair of contacts which are completely shielded within the insulating material, wherein the radial fingers of the plug are received by means of rotation thereof in such a way that all the electrical and conductive parts are completely concealed within the insulating material of the system.

A further object of the invention is to provide a connector including a contact receptacle provided with a resiliently supported cover enclosing the contacts therein when the associated plug is removed, but being displaceable by insertion of the plug to establish electrical contact therebetween.

A still further object of the invention is to provide a receptacle having means to resiliently eject the plug when the latter is released therefrom.

One more object is to provide a system of the above character wherein a plug is provided with a cover or lid, which covers all the metallic portions except the ends of said fingers, and having a stem with a pair of grooves, one for each of the lead-in wires which take the current out of the plug in order to avoid accidental short circuits by a jamming or continued motion of said plug, especially by rotation thereof.

Other and additional objects and advantages of the present invention will be apparent as the present specification proceeds, taken in connection with the accompanying drawings wherein:

FIG. 1 is a top plan view of the electrical plug and receptacle system of the invention with the lead-in plug introduced in the contact receptacle;

FIG. 2 is a cross-sectional elevational view of the system of the present invention, taken along line 2—2 of FIG. 1 and looking in the direction of the arrows;

FIG. 3 is a top plan view of the system of the invention with portions of the plug removed in order to show inner details of the plug-receiving receptacle;

FIG. 4 is a view of the contact receptacle portion of the system of the present invention, taken along line 4—4 of FIG. 2 and looking in the direction of the arrows, and showing the housings for the metallic clips within said contact receptacle;

FIG. 5 is a bottom plan view of the plug of the system of the present invention, with its cover removed in order to show the fingers and the stem projecting from said cover which effects the separation of the lead-in wires;

FIG. 6 is an exploded cross-sectional view of the assembly shown in FIG. 2;

FIG. 7 is a cross-sectional view of a modification of the structure shown in FIG. 2;

FIG. 8 is a perspective view of an extension device which involves the principles of the invention and representing a different embodiment thereof;

FIG. 9 is a cross-sectional view of the receptacle shown in FIG. 8; and

FIG. 10 is an illustration of an application of the plug and receptacle system of the present invention to hang a lamp from a ceiling.

Having now more particular reference to the drawings, specifically FIGS. 1—6, there is shown a plug and receptacle system which comprises a plug 10 and a receptacle 11 to receive the plug. Plug 10 is formed by a solid body 12, more clearly shown in FIG. 6, and from which a cylindrical projection 14 extends downwardly. Body 12 can have a plurality of grooves or depressions 13 to facilitate manual rotation when introduced or removed from the complementary receptacle 11. Axially extending through plug 10 is a bore 15 to receive the lead-in wires 20 and 21 of a cable 22.

The exposed end of projection 14 is flat and has a pair of depressions to receive a pair of fingers or blades 16,

fixed by means of screws 17. Said fingers or blades 16 have a radially directed straight portion extending outwardly of projection 14, FIGS. 5 and 6, to enable them to engage contact clips 23 in the receptacle, and a curved portion 16' which is nested within the corresponding depressions of member 14, and in which is threaded a contact screw 18 for connection to lead-in wires 20 and 21, respectively. The fingers or blades, at the edge thereof facing the inlet opening of the contact clips, are provided with a bevel portion 19 to facilitate the entrance of fingers or blades 16 into the clips 23.

Plug 10 is provided with an insulating cover 24 including a cylindrical portion 25 surrounding a convex cap 26, from the center of which a stem 27 is projected upwardly having a pair of diametrically opposite longitudinal grooves 28 within which the lead-in wires 20 and 21 are arranged to effect their separation and avoid short circuiting, as best shown in FIGS. 2 and 5. The housing portion 25, 26 of cover 24 encloses the contact screws 18 and lead-in wires 20, 21, thus avoiding possible inadvertent or accidental touching of current conducting parts when the plug is connected, as by means of a metallic object accidentally introduced within receptacle 11.

Contact receptacle 11 comprises two separable members 29 and 30 of insulating material. The member 29 comprises a ring, which has a pair of arcuate depressions 31 within which the upper blades 35 of the contact clips 23 are nested, FIG. 4, conforming to the circumferential contour of the diameter which corresponds to the separation between both clips 23 in order to provide a circumferential path for the introduction of radial fingers 16 by means of rotation of the plug 10. Member 29 has also a large diameter central bore 32 for receiving projection 14 of the plug. A pair of diametrically opposed grooves 33 open into said bore, which correspond to the opposite position of fingers 16 of the plug, in order to allow passage thereof to the position to effect rotation and introduce them within the contact clip 23 (see FIG. 2). Finally, said member is provided with a pair of holes 34, preferably threaded, to receive fastening screws adapted to join member 29 with member 30 in order to form a complete contact receptacle.

Member 30 is a cup which has within the same a cylindrical bore 32' complementary to bore 32 of member 29 and which jointly defines a well 28, FIG. 3. The thus formed housing is completed by a flat bottom 37. A pair of depressions 38 is also provided to house the lower blade 36 of the contact clips 23, and bores arranged in the same relative position relative to the bores 34 of member 29 to provide passage of screws 39. In the embodiment particularly illustrated in FIGS. 1-6, said screws 39 fasten both members 29 and 30 and also pass through the clips 23, thereby functioning as current terminals to connect lead-in wires 40 and 41 which are joined to form a cable 42, FIGS. 2 and 4. However, this latter arrangement of the said screws can be modified by providing some other means to join one member 29 and 30 to the other and by providing terminals connected to clips 23 other than screws 39.

According to a modification shown in FIG. 7, the parts 29a and 30a of a receptacle 11a may be readily separable in the event that it is necessary to quickly deenergize the apparatus to which the safety connector is connected. For this purpose, the clips 23 are replaced by resilient contacts 36a, in lieu of the clip blades 36, and the parts 29a and 30a are normally secured together by leaf springs 45 projecting from one part, part 29a for example, and engaging in recesses 46 in the other part. If desired, retaining members 35a, corresponding to the blades 35, may be secured in the part 29a to retain the contacts 16 and ensure engagement thereof with the contacts 36a. By this arrangement, the apparatus may quickly be disconnected merely by pulling on one of the cables 22 or 42.

A resilient ejector comprising a coiled spring 43 may be mounted in the well 28 within the receptacle 11, 11a

for engagement with the cap 26 of the cover 24. If desired, a dish element 44 may be mounted on the spring 43, as best shown in FIG. 6, for nesting the cap 26 as shown in FIG. 2. When the plug 10 is introduced into the receptacle 11, 11a, the spring 43 is compressed by the cap 26 so that when the plug is disconnected the spring 43 serves to eject it from the receptacle.

The present plug and contact receptacle system can be used as an extension, such as illustrated in the embodiment of FIG. 8, and in this case the form of both the body 12' of plug 10' and the part 30' of the receptacle 11' are elongated in order to enable each to be grasped with one hand. Otherwise, the performance and structure of this embodiment is entirely similar to that described in connection with FIGS. 1-6. The receptacle 11' can also be readily separable for quick disconnection of the electric current supply. As shown in FIG. 9, leaf springs 45' may be fixed in and project from the part 30' for engagement in recesses 46' in the part 29'. The wires 40, 41 of the cable 42 are connected to contacts 36a' carried by the part 30', and retainers 35a' may be carried by the part 29' in registry with said contacts.

The device of the present invention can also be very useful as a ceiling fixture, as shown in FIG. 10. In this event, the receptacle 11, 11a may be attached to the ceiling to serve as an outlet box and plug 10 is used as a support for a light fixture, for example, including a socket 48 and an electric bulb 49.

Although certain specific embodiments of the invention have been shown and described, it is obvious that many modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

We claim:

1. A safety connector for low tension electrical installations which comprises in combination a receptacle and a plug, said plug being formed of insulating material and including an outer portion with a flat bottom surface and a cylindrical portion extending from said flat bottom, a pair of thin metal conducting blades fastened to the cylindrical portion of the plug to extend radially outwardly thereof and lying in a plane perpendicular to the axis of said portion, means on each of said metal blades for connection with lead-in wires, said plug having a central bore to accommodate the lead-in wires, and said receptacle comprising a cylindrical composite member formed of insulating material and comprising two parts, said receptacle having a central recess of a diameter slightly larger than the diameter of the cylindrical portion of the plug to receive said cylindrical portion, a pair of slots extending outwardly and radially from the central recess to receive said radially extending blades, and a pair of arc-shaped openings disposed between the central recess and the periphery of said receptacle and in diametrically opposed positions, said slots and arc-shaped openings being partly formed in both parts of the receptacle, and said arc-shaped openings each connecting at one end with one of said slots to receive said blades upon rotation thereof, a pair of flexible contacts seated in said arc-shaped openings and completely concealed from the outside of the receptacle to prevent accidental contact therewith, means for connecting said contacts to power lead-in wires, one part of the receptacle being formed so as to provide narrow slits opening into said central recess to permit rotational movement of said blades from said slots into said arc-shaped openings, and said receptacle parts being detachably fastened to each other by a pair of leaf springs each fastened at one end to one of the parts and having its other end engaging in a corresponding recess provided in the other part and readily separable therefrom under a given tension when an excessive pull is applied to the plug or receptacle, whereby said members are automatically released and separated avoiding damage to an appliance to which the connector may be connected.

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2. In a safety connector for low tension installations of the type including a plug and a receptacle having a central recess and radial grooves to receive said plug, and wherein said plug has radially outwardly directed contact blades to be inserted in the axial direction into said recess and radial grooves in the receptacle and capable of being rotated to accommodate said blades into engagement with a pair of contacts concealed within said receptacle, the improvements comprising, in combination, a hollow cover enclosing the metal parts of said plug except the ends of said contact blades, said plug having an axial bore and said cover being provided with a stem inserted in said axial bore, said stem having a pair of longitudinally extending spaced grooves for receiving two lead-in wires to separate them and avoid short circuiting, and said receptacle being formed of two parts which are detachably fastened to each other by a pair of leaf springs each fastened at one end to one of the parts and having its other end engaging in corresponding recesses provided in the other part and readily separable therefrom under a given tension applied to one of said members when an excessive pull is applied to the plug or receptacle, whereby said

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members are automatically released and separated avoiding damage to an appliance to which the connector may be connected.

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